

XXXVI. *An Account of the Observations made on the Transit of Venus, June 6, 1761, in the Island of St. Helena: In a Letter to the Right Honourable George Earl of Macclesfield, President of the Royal Society, from the Rev. Nevil Maskelyne, M. A. and F. R. S.*

My Lord,

Read Nov. 5, 1761. **I** Am sorry I cannot have the honour of gratifying your Lordship, and the Royal Society, with an account of a more complete observation of the transit of Venus, than what I herewith transmit to you. From the very cloudy weather, which prevailed here for the whole month preceding the transit, I, indeed, almost despaired of obtaining any sight of it at all. I was, however, fortunate enough to obtain two fair views, though but of short continuance, of this curious celestial phænomenon. The first was a few minutes after sun-rise, when I was surprized not only at seeing Venus so very large, but also so much nearer the sun's limb, than I had reason to expect from the best grounded calculations; which last circumstance foreboded, that she would make a more speedy exit from the sun's body, than the same calculations allowed; which accordingly happened. At this time, her limb, as well as the sun's, appeared exceedingly ill defined, which was no more than what one might naturally expect, from their great proximity to the horizon.

This

This alone was sufficient to prevent my making any observations, at that time, which could admit of any exactness, if the clouds had not presently come up, and totally deprived me of the sight both of Venus and the sun. In this manner the skies continued unfavourable for about an hour, when they grew again extremely clear, and I had the pleasure of seeing Venus appear as an intensely black spot upon the sun's body, and perfectly well defined. At this time, I measured the distance of the nearest limbs of Venus and the sun from each other, with the curious object-glass micrometer adapted to the reflecting telescope, according to Mr. Dollond's ingenious invention. This distance was  $1' 44\frac{3}{4}''$ , at  $7^h 31^m 7^s$  apparent time, or  $7^h 29^m 15^s$  mean time. I think it proper to take notice, that though Venus's limb and the sun's appeared as well defined, as could be desired; yet, when the artificial internal contact of Venus's limb with the sun's was made, in order to measure their distance, Venus's limb alternately dilated itself over, and contracted itself within the sun's limb, by a small space. I endeavoured to take it in the middle of this vibration; but I beg leave to refer it to your Lordship's opinion, whether, if the real internal contact had happened at this time, it could have been observed, in such circumstances, to that degree of exactness, which the great Dr. Halley hoped for; and whether, on occasion of the next transit, which is to happen eight years hence, it might not be convenient, that the observers should endeavour to place themselves on such parts of the globe, as that they may not see Venus on the sun's body, very near the horizon, but rather when they are both elevated

to considerable heights; which will afford them a greater chance of making their observations free from clouds, which usually skirt the horizon, as well as of making them to advantage.

Presently after I had measured the distance of Venus from the sun's limb, the clouds returned again, and prevented me, not only from making any more observations of the same kind, or measuring Venus's diameter, but also, what was of much more consequence, from observing the last internal contact of Venus from the sun's limb, which was the principal observation of all. About 23 minutes after eight, the clouds separated again, and the sun appeared very bright and clear; but there was not the least appearance to be seen of Venus, though I thought myself in a manner sure of observing at least the external contact, as all the calculations make the end to happen much later.

Mr. Waddington took the passages of Venus and the sun's limbs, across the horizontal and vertical wire of the equal altitude instrument. All the observations, which he was able to make, are as follow:

June 6,

Mean time, in the morning.

H. M. S.

7 24 1 ☉'s lower limb at horizontal wire.

7 24 18 ♀'s centre at vertical wire.

7 27 43½ ♀'s centre at the horizontal wire.

28 50¼ ♀'s preceding limb touches vertical wire.

29 9½ ☉'s subsequent limb at vertical wire.

H.

H. M. S.

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|----|----|----|---|
| 7  | 31 | 56 | ☉'s lower limb at horizontal wire.  |
|    | 32 | 17 | ☿'s centre at the same.   |
| 33 | 5  | }  | ☉'s western and subsequent limb at vertical wire.   |
| 34 | 53 |    | ☉'s upper limb at horizontal wire. The observation of this limb of the sun was but indifferent. |

N. B. As the telescope inverts, the observations, as usual, are set down according to the appearance.

I heartily wish the other attenders upon this rare celestial phenomenon may have had a more favourable opportunity of making their observations, than I have had. But as it is to be feared, that our other observers, Mr. Mason and Mr. Dixon, by the misfortunes they have met with, have not been able to make their observations at Bencoolen, as was proposed; I humbly hazard my opinion, and submit it to your Lordship's better judgment, whether the difference in the total duration of the transit of Venus over the sun's disk, observed in any two places, where, it is likely, observations have been made, will be great enough to enable us to infer the sun's parallax with sufficient exactness, or even nearer than it is known already. So that I am afraid we must wait till the next transit, in 1769, which is, on many accounts, better circumstanced than this, before astronomers will be able to do justice to Dr. Halley's noble proposal, and to settle, with the last and greatest degree of exactness, that curious and nice element in astronomy, the sun's parallax, and thence determine the

true distance of all the planets from the sun, and from each other.

Your Lordship will excuse me, that I do not at present attempt to deduce any consequences from the above observations, not only as I am in want of others corresponding to them made in other places, but also as I am not yet able to settle the longitude of this place to sufficient exactness; though I am of opinion, it cannot differ much from that, which Dr. Halley hath assigned to it. I have not yet been able to get one observation of an eclipse of Jupiter's satellites, though I have not failed, on my part, of being ready to seize any opportunity, if it had offered; the very cloudy weather, which prevails at this time, which is the winter here, depriving me not only of these, but also almost all other observations.

I cannot conclude, my Lord, without making one remark, that if the late noble Dr. Halley were now alive, he could not receive greater pleasure from seeing the observation of the transit of Venus undertaken by astronomers of different nations, conformably to his proposal, than from finding it so warmly espoused by your Lordship, and the Royal Society, to whom, as a perpetual body, whose care it would be always to watch over the interest and advancement of science, he particularly recommended it. Nor can the learned world but look upon themselves as highly indebted to your Lordship, for that noble zeal, which you have manifested for the improvement of astronomy, in setting forward, and promoting, these literary expeditions, which tend to the benefit of mankind, and the honour of our native country.

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Taking things in this light, we may presume to say, that our design was not unworthy the attention of his late Excellent Majesty, our Patron, who so nobly supported us in defraying the expences of these expeditions; for whose memory we are bound always to retain the highest respect.

Unfavourable circumstances may, perhaps, have prevented us from reaping all the benefit, that might be hoped for from these undertakings; but they can never deprive us of the satisfaction of thinking, that we have done all, that lay in our power, to answer and fulfil such noble and important views. I have the honour to be,

My Lord,

With the greatest respect,

Your Lordship's

most obedient,

and devoted

humble servant,

Nevil Maskelyne.